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United States Forest
Department Of Service

Agriculture

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Reply To: 3420

Date: September 25, 1990

Subject: Evaluation of Grace 37 Plantation, Mad River
Ranger District (FPM Report No. N90-11)

To: Forest Supervisor, Six Rivers National Forest

On August 14, 1990, Dave Schultz, Sheri Smith, entomologists, and I visited the Grace 37 plantation (T. 1 N., R. 6 E., sections 20 and 21) on the Mad River Ranger District. We were accompanied by Dick Tucker, Chuck Hetrick, Vern Neal, and Ray McCray from the District.

This 5-acre area was tractor-logged in 1980. The previous stand had been principally Douglas-fir. It was planted with Douglas-fir in 1981. Some residual ponderosa pine and black oak are still present. The plantation was precommercially thinned in 1985. Some replanting of Douglas-fir was done where stocking was low. Additional Douglas-fir had seeded in from the surrounding stand.

A number of pockets of dead and dying Douglas-fir had been observed by District personnel. They suspected black stain root disease, caused by Leptographium wageneri var. pseudotsugae (syn. Verticicladella wageneri), as being the cause. The type of injury, dead and dying trees, declining crowns, shortened terminal growth, and stress cone crops, are typical of this root disease in the younger age class of trees. We found the dark stain following the annual rings in the wood at the base of several trees confirming the presence of black stain root disease.

The fungus, L. wageneri, has several strains which attack a number of hosts. The strain on Douglas-fir is specific to this host and is not known to attack other tree species. The fungus occurs in the roots and lower boles of infected trees. It occupies the vascular tracheids in the sapwood, blocking water transport. Several root-inhabiting insects are vectors, primarily a bark beetle, Hylastes nigrinus, and two weevils, Pissodes fasciatus and Stereomnius carinatus. These insects feed and breed in the phloem and cambium on roots of cut and declining Douglas-firs. Phloem may be suitable for attack for 2 years after tree death. It is believed that the fungus sporulates in the insect galleries and emerging adults pick up the spores on their body. The fungus is then transmitted to another site when these adults feed on or breed in new roots. Once established in a root, the fungus grows through the tracheids and can attack the roots of surrounding Douglas-firs by growing for short distances through soil. Disease centers may continue to expand until there is a break in host roots, such as by the presence of a non-susceptible species, a road, or a stream.





There is no known method of directly controlling this disease once it is established in a stand. Neither is it known what conditions actually cause the initiation of new centers. There is evidence that precommercial thinning is associated with increased incidence of black stain root disease, especially where previous harvesting was done with a tractor. It is not known if the presence of the disease in a stand prior to thinning influences the occurrence of additional infections following thinning.

It is impossible to determine the actual time that the root disease centers started in Grace 37. Their size and the condition of the older dead trees suggests that they originated about the time of thinning in 1985. The existing knowledge about this disease supports the idea that the stumps created in 1985 were the source of infection by the disease.

Some mature Douglas-firs along the edge of the residual stand have recently died or are showing signs of severe decline. Black stain root disease was not found in these trees. These trees have undergone a decline in vigor due to exposure from logging, followed by several years of drought. The decline in vigor has allowed successful infestation by the fir flatheaded borer, Melanophila drummondi. Mortality should decline as precipitation returns to normal. Attempts to salvage the dead trees under the current situation would probably increase the likelihood of mortality of surrounding trees because of added stress due to site disturbance.

MANAGEMENT ALTERNATIVES

1. No Action. Black stain root disease will continue to spread underground in existing centers where Douglas-firs are present. Pine and oak root systems will block disease spread. Most Douglas-firs in centers will not reach merchantable size. This will result in unstocked and understocked holes in the plantation occupied by brush species. Because of the number and location of the infection centers, coalescing can be expected. Survey information suggests that once a plantation reaches age 30 the effects of the disease lessen and mortality subsides. That will be another 20 years in Grace 37, however.

Additional root disease centers may develop around weakened trees if they are attacked by insects vectoring the fungus. Because the trees have been spaced and are above the competing vegetation, most of them should be vigorous and not attractive to the insects. If new centers are created, then outward spread will progress as described above.

2. Remove Trees from Root Disease Centers. Root disease centers would be identified on the ground based on above ground symptoms. All Douglas-firs in the centers would be removed. The openings created would be planted with a non-susceptible species, such as ponderosa pine. This would help to maintain site productivity. It can be expected that Douglas-firs on the periphery of these openings may become infected and additional openings would be created.

3. Modify Harvesting. This is not an alternative for the Grace 37 plantation, but may be appropriate for other future harvest units in the area. There is





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evidence that the incidence of black stain root disease is higher on sites that had been harvested with tractors rather than with cable systems. In areas where black stain root disease is a concern, it has been suggested that tractor logging be limited, even on gentler slopes. Where this type of limitation is not possible, minimizing the amount of skid trails and limiting tractors to the trails may be beneficial. The reason for this association is not known, but until more information is available it may be advisable to limit soil disturbance on sites near areas where the disease is already present.

If there are any questions about this report or if you would like additional assistance, please contact Dave Schultz or me at (916) 246-5101.

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